SM 3H

1.8 Complex Zeros & The Fundamental Theorem of Algebra

2017-2018

Name _____ Date _____ Period _____

Write the polynomial in standard form, and identify the zeros of the function and the x-intercepts of its graph. Show work!

1. $f(x)=(x-3i)(x+3i)$

2. $f(x)=(x-1)(x-1)(x+2i)(x-2i)$

Write a polynomial function of minimum degree in <u>factored form</u> with real coefficients whose zeros include those listed, <u>find the degree of the polynomial (# of zeros)</u> and <u>identify the x-intercepts</u>. Show work!

3. $1-2i \text{ and } 1+2i$

4. $2, 3, \text{and } i$

5. $-2, \text{and } 1+2i$

6. $\pm\sqrt{3}, -4, \text{and } 5-6i$

Write a polynomial function of minimum degree in <u>standard form</u> with real coefficients whose zeros include those listed, <u>find the degree of the polynomial (# of zeros)</u> and <u>identify the *x*-intercepts</u>. Show work!

7. $x = 2 \; and \; 3i$

8. $x = 0 \; and \; 2 - 5i$

Write a polynomial function of minimum degree in <u>factored form</u> with real coefficients using the following information, <u>find the degree of the polynomial (# of zeros)</u> and <u>identify the *x*-intercepts</u>. Show work!

9. $1\left(multiplicity\ 2\right), -2\left(multiplicity\ 3\right)$

10. $2\left(multiplicity\ 2\right), 3+i\ (multiplicity\ 1)$

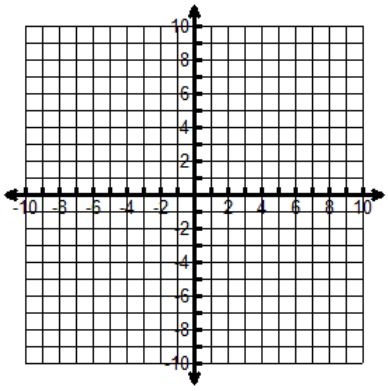
11. $leading\ coefficient: 2$
$x = 5i\ (multiplicity\ 1), 2 + 4i\ (multiplicity\ 1)\ and\ x = -8\ (multiplicity\ of\ 2)$

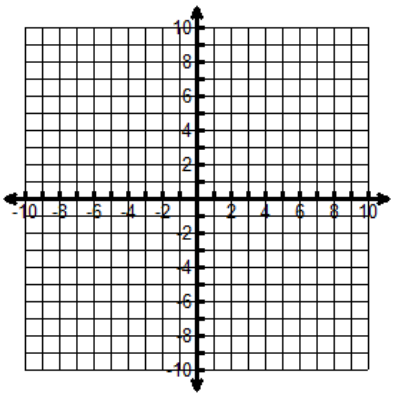
12. $leading\ coefficient: -2$
$x = 2i\ (multiplicity\ 1) and\ x = -6 (multiplicity\ of\ 3)$

Write a polynomial function of minimum degree in <u>standard form</u> with real coefficients whose zeros and their multiplicities include those listed. Find the <u>degree of the polynomial</u>, the <u>*x*-intercepts</u> and <u>sketch the graph.</u> Show work!

13. $leading\ coefficient: -1$
$x = 0\ (multiplicity\ of\ 2),$
$x = 3\ (multiplicity\ of\ 2)$

14. $leading\ coefficient: -2$
$x = 4, x = 1 + i$





Match the polynomial function graph to the given zeros and multiplicities.

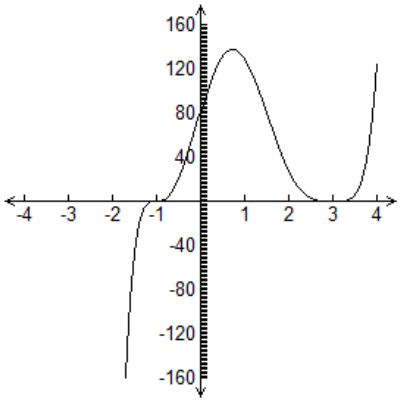
15. $-3\left(multiplicity\ 2\right), 2\left(multiplicity\ 3\right)$

16. $-3\left(multiplicity\ 3\right), 2\left(multiplicity\ 2\right)$

17. $-1\left(multiplicity\ 4\right), 3\left(multiplicity\ 3\right)$

18. $-1\left(multiplicity\ 3\right), 3\left(multiplicity\ 4\right)$

a)



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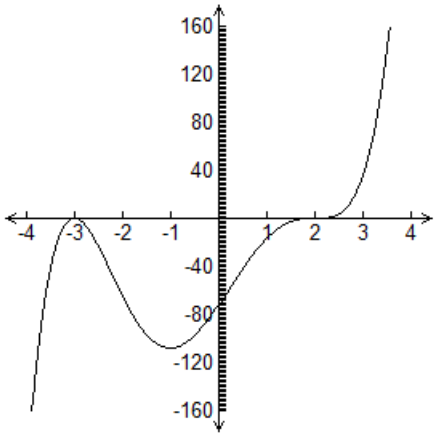

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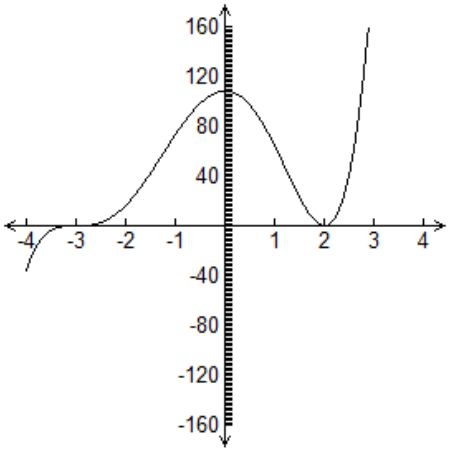

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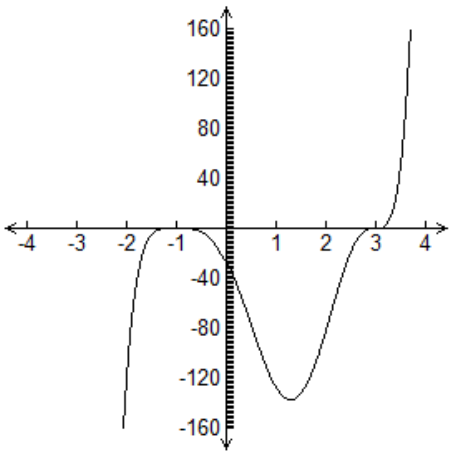

Find all complex zeros of each polynomial. Write the function in factored form. Show work!

19. $f(x)=x^3+4x-5$

20. $f(x)=3x^4+8x^3+6x^2+3x-2$

21. $f(x)=2x^3-3x^2-4x+6$

22. $f(x)=x^3-6x^2+7x+4$

Using the given zero, find all the remaining zeros of each polynomial. Write the function in factored form. Show work!

23. $1+i$ is a zero of $f(x)=x^4-2x^3-x^2+6x-6$

24. $4i$ is a zero of $f(x)=x^4+13x^2-48$

Using the given zero, find all the remaining zeros of each polynomial. Write the function in factored form. Show work!

25. $3-2i$ *is a zero of* $f(x)=x^4-6x^3+11x^2+12x-26$

26. $1+3i$ *is a zero of* $f(x)=x^4-2x^3+5x^2+10x-50$

Write the function as a product of linear and irreducible quadratic factors all with <u>real coefficients (don't go to imaginary numbers</u>. Show work!

27. $f(x)=2x^3-x^2+2x-3$

28. $f(x)=x^4-2x^3+x^2-8x-12$

Read each question below and be ready to discuss them in class tomorrow.

29. Is it possible to find a polynomial of degree 3 with real number coefficients that has -2 as its only real zero? Explain.

30. Is it possible to find a polynomial of degree 3 with real coefficients that has $2i$ as its only nonreal zero? Explain.

31. Is it possible to find a polynomial $f(x)$ of degree 4 with real coefficients that has -3, $1 + 2i$ and $1 - i$? Explain.

32. Is it possible to find a polynomial $f(x)$ of degree 4 with real coefficients that has $1 + 3i$ and $1 - i$? Explain.

33. Which of the following cannot be the number of real zeros of a polynomial with degree 5 with real coefficients? Explain your answer.

a) 0 b) 1 c) 2 d) 3 e) 4

34. Which of the following cannot be the number of nonreal zeros of a polynomial of degree 5 with real coefficients? Explain your answer.

a) 0 b) 2 c) 3 d) 4

Find the unique polynomial with real coefficients that meets these conditions.

35. Degree 4; zeros at $x = 1 - 2i$ and $x = 1 + i$; $f(0) = 20$